

**Joint Meeting of the FAA's Research, Engineering & Development Advisory Committee
(REDAC)**

and NASA's Aerospace Technology Advisory Committee (ATAC)

October 1, 2002

Holiday Inn Westpark, Rosslyn, VA

Agenda:

Opening Remarks

The meeting was called to order by Dr. Deborah Boehm-Davis, Chair of the REDAC, and Mr. David Swain, Chair of the ATAC. Mr. Charlie Keegan of the FAA extolled the meeting as an opportunity for the sharing of mutual resources. Dr. J.F. Creedon echoed Mr. Keegan's remarks and added that the mutual goal of the ATAC and REDAC is to revolutionize aviation. It was noted that the aviation industry is in a very difficult and transitory position, and it is vital to ensure that the U.S. is positioned for the 21st century. Aviation is a vital part of the economy and national security; it is necessary to remain focused and move the community to the next level.

U.S. Aerospace Leadership – Impact of European Vision 2020 and Initiative

Mr. John Kern, a member of the REDAC and ATAC for 5-6 years and a member of a number of subcommittees presented an overview of Europe's Vision 2020 plan. He presented an informal gathering of comments to the joint session. He noted that the primary issue is to modernize the national airspace system. A second concern is with a lack of leadership in the aerospace industry. Modernization, or a national transportation vision, is defined as "to go anywhere with anything anytime." New ideas like SATS must also be incorporated into this vision. Capacity is a significant issue, with a near doubling of passengers forecast over the next 10 years, and an additional need to embed security aspects into this growth. The industry must also be more diligent in assessing environmental impact. U.S. Government leadership needs to establish relationships with the aviation community in order to push the same "wagon." Who is the leader here? What is at stake is the loss of growth and output, the accrual of large security costs, and the loss of opportunities to address issues synergistically. Work is underway in other organizations in demonstrating what a modernized system would look like. It is time to put them together to develop a long-term concept of operations. The OEP is a great foundation, but it needs a target. A suggestion is to create a vision beginning with OEP that goes thru 2020 to 2050. Cost and benefit analyses must be a major component of this effort, as well as provision for international cooperation. The industry should continue the good work already begun; collect, analyze, and put these efforts into the right plan. Issue two is global leadership. U.S. leadership in aviation is declining; there is no plan to address this at either the DOT or FAA level. Europe has a blueprint for 2020. It appears that the U.S. has pulled back from ICAO and international relationships. European results are not shared with us because we were not part of the effort. One simple example is the TCAS story- we don't have a home for it anymore. We need a national strategy to regain our leadership position. This is not news to this group. A comment was proffered by an audience member, who thought that for the last 2-3 yrs the FAA had kept its ICAO commitments quite well. Mr. Kern replied that the negative perception came from a lack of standardization in a communications plan, and a perceived lack of support for the representative. In summary, it was

agreed that Mr. Kern's recommendations aligned with aerospace industry recommendations and also with those of the National Research Council (NRC)

NAS Operational Evolution Plan (OEP) and Beyond

Mr. Duane Dupon presented an overview of the FAA's Operational Evolution Plan. OEP results are available on the web (www.faa.gov/programs/oep). OEP is a public commitment to an operational change. The underlying principle is that "there's always a constraint in the system." It's a matter of understanding the pain in the system. Runway occupancy time was given as an example: Can we land a plane every 20 seconds with a 10 second margin? If this were possible, we could land 120 planes an hour. Can we envision a system that allows us to do this? RMP is another system parameter; can we create HOV ramps, on and off ramps, slow ramps and fast ramps at airports. Areas of congestion must be reviewed and visualized. The air carrier business model may be changing; there are now more small carriers, with larger ones in trouble. Southwest, AirTran, Jet Blue, and Frontier are doing alright; what does this mean for us? Benchmarked airports were discussed, with a vision of a system-wide information network, characterized by constant sharing of information and decisions, with decision support tools that use intelligent agents. Precise navigation and situational awareness, controlled time of arrival, and real-time collaboration are the goals. How do we move OEP forward? The research community is a change agent for the OEP. Currently, the OEP can hold the line on delays, but is looking for technology that increases capacity.

A committee member asked: What is the plan to develop the process? Mr. Dupon replied that the research community was consulted. There are good ideas but no commitments to actual plans or one solid solution set that would be an operational change. Who is going to manage this?

A member commented that he sees a disconnect between the research community and what they would like to do. For instance, what research should NASA be doing? Mr. Keegan commented that the question is how we can get something from research into the operational change state. We need to use the Technology Readiness Level (TRL) concept. Before we can commit, we need to understand what metric we are moving (performance goals). We need to see how much the metric will be moved, then we decide how much money to spend. If we want to create a new metric, it must represent some value to the community or the public at large. The IIAPT is just documentation of what we are doing- it brings no money with it. We should be able to choose what we will do in order to move forward.

There was an offer to have the ATS subgroup of the REDAC serve as a well-informed advisory group to both NASA and FAA, to help with metrics and other matters.

A member commented that movement into bold technologies cannot occur without a bold vision otherwise we are confining ourselves to short-term changes. We need to adjust cultural and financial expectations to create a bold vision for a command and control structure, with a clear end-goal. The economic impact of civil aviation needs to be considered; the OEP is a great start and shows that we need aggressive investment in our aviation infrastructure- a 4.5-to-1 return on investment. This should form a rallying point for the FAA. Mr. Keegan remarked that the day's issue of Aviation Daily reported that the FAA was directed to cut spending by the House to address the industry downturn. That is why it is necessary for the aviation community to put out the contrary message. The next OEP Executive Summary will be in December 2002.

A member asked: is there an agreed-upon method to do perform a paper study on “moving the metric” to look at some technology and then try it out in some limited way? Mr. Keegan replied that a need cost/benefit analysis was needed, and the decision on what other values are important was a time-dependent factor. The methodology is well grounded and well documented. A potential statistical fatality parameter is an example; what if some change saves a life? Some have a difficult time with this concept but we don’t want to leave it out.

NASA Enterprise Strategy

Mr. Creedon reviewed the mission and vision statement of NASA. The tenet “To improve life here and to understand and protect our home planet” was highlighted. The top-down flow of the strategic plan was reviewed. The principle goal is to enable a safe, secure, and environmentally friendly transportation system. Education is also now recognized as a NASA goal; we want to inspire the next generation of explorers and improve the nation’s declining scientific literacy. Enterprise themes of aerospace technology include revolutionizing aviation technology.

A mission statement was proposed: NASA wants to pioneer and validate high-risk and high-payoff technologies. Success should be measured by the extent to which NASA results are used to improve the quality of life in society. NASA’s key aviation challenges are to increase safety and security, protect the environment, increase mobility, and support national security. Theme objectives were reviewed.

For FY02, turbulence radar data enabled pilots to get 30 seconds advance warning of a turbulence event. The false positive rate is still too high, but NASA is working on it. A member asked if safety had been compromised by a diversion of NASA resources to security concerns. Mr. Creedon replied that \$500M, over 5 yrs, had been self-directed from other resources into the security program. The idea is to try to embrace security without harming safety too much. In practice, NASA has diverted funds from safety areas where NASA contributions had already been put into practice. Weather and synthetic vision has been put into the cockpit. It is not a miracle of loaves, but NASA feels that this solution was practical.

A member asked if NASA goals were the same as the FAA’s goals? Mr. Creedon replied that they were not the same in the capacity area, but in other areas. Mr. Keegan commented that the safety goals are probably not the same, in general, and felt that NASA goals are far beyond those of FAA. FAA strategies are to keep just ahead. A comment was made that goals are set by institutions in the government, and what we really need are national strategies and goals. This would help to clarify competing and noncompeting goals by each government entity. NASA estimated that its technologies if implemented, the accident rate would be reduced by 55%. General aviation safety goals must be agreed upon between NASA and FAA. Mr. Keegan added that the establishment of national goals must be a coordinated effort.

VAMS/21st Century Aviation System Planning

Mr. Robert Jacobsen discussed the Future Operational Concept Development for Virtual Airspace Modeling System (VAMS). Forecasting and availability of technology must also be integrated into planning, with new issues brought about by the events of 9/11. Systems architecture will require a broad systems look, not just a systems analysis. VAMS has been successful in some areas. It is collecting the existing models for simulation and developing them into a more complete set of models. Current mass is being used to assess the validity of the baseline. VAMS is also developing a set of operational concepts. However, we are all stuck in

the same rut just to remain profitable. In essence, we came up with a list of operational concepts for VAMS, categorized by domain- this means we are not thinking out of the box. Developments surrounding origins to destinations, surface, terminal, en route are mostly technology pushes. There need to be more vision-pull solutions for the future (30-50 years out). Transforming NAS, in a notional sense, must transpire in transition periods and must be periodically re-assessed. Initial design space must be shrunk down into the future NAS. RTCA 2002 ConOps has many operational modes, and not all of them are used today- there is room for growth in the ConOps document. We may need new ways of operating that are not currently identified and must allow new modes to be developed. The VAMS tool accounts for economic and safety impacts. Data concerning long-term efforts to model economic, safety, and business effects are available at the FAA's Policy Office.

Mr. Rediess reviewed the 21st century aviation system strategy. The ATAG vision of the future air transportation system is to move people and goods on schedules that meet consumer needs, operate without fatalities and injuries, be environmentally acceptable, and support an integrated aviation support system. The purpose is to develop capabilities that are scalable out to the mid-century and use these concepts as guides for an R & D program. It should also provide incremental improvements while evolving seamlessly toward a future system that continually satisfies national needs. The process requires mission requirements and performance goals. Ongoing R & D on high-potential concepts factors in socioeconomic terms, both nationally and globally. Air transportation segments (leisure, business, special operations, military, space, etc) need to be identified and each sector must have its needs analyzed. Air Transportation Mission Requirements and Performance Goals was outlined as a model for a desired future air transportation for 2020 and beyond, based on projections. Concepts must meet all mission requirements. Mr. Rediess solicited committee comments on the proposed process and other parameters.

A member asked: how do you plan to take advantage of monies already invested? Mr. Rediess replied that NASA wants to build on everything that has been done to avoid re-invention. NASA is planning to use the VAMS program as a modeling technique, but is not limiting it to NASA modeling activity. There are also other useful company models: LMI, Mitre, etc.

A member commented on the limited value of models; i.e., there are no magic models. Who makes the final decision on which concept will be chosen? Mr. Rediess replied that he hopes that it is a combined NASA/FAA decision; there may be multiple concepts. Someone has to allocate money somewhere at some time point. A member commented that the FAA should lead this decision, not NASA.

Future Directions in Joint FAA and NASA Cooperation

Mr. Keegan noted that he and Dr. Creedon have already had open and candid, functional discussions on how they are going to proceed and are off to a good start. Dr. Creedon remarked that NASA is here to stay in terms of meeting the needs of FAA, and added that we need to make the best of our investments, and can't afford duplications and needless tasks. A member asked: how far do we need to take a technology before we can use it? Dr. Creedon replied that he would be flexible in cooperating with the FAA in transitioning technologies into practice.

Mr. Swain observed that there is confusion (in some Committees) about the roles of NASA and FAA in some aviation areas. These roles need to be clarified if budgets are not to suffer.

Mr. Keegan commented that the key for the transition is the in the planning of resource transition.

A member asked if NASA and FAA could use Homeland Security budget monies. Dr. Creedon replied that NASA has looked at this possibility and has tried to present potential areas of interest. Homeland Security will consider pieces relevant to security and subsequent funding; this may be relevant to future surveillance needs in systems that do not use radar. Only AATT is focusing on capacity; NASA is more focused on safety.

The Aerospace Commission is writing a report about the cooperation of NASA and FAA and are strongly recommending much more cooperation and coordination across FAA, NASA, and DOD for air safety and security. Mr. Keegan commented that the industrial base is being depleted and that there must be specific attention addressed to this problem. FAA would rather see hard recommendations. The Commission is also considering a single, integrated plan to be followed by all the agencies.

Dr. Boehm-Davis commented that the REDAC discussed the need for a plan after OEP, and that the question was what will be the vision of the system after the next system; there is room here for development of a plan. The two agency plans may be different, but with some vision pull, there may be a way to coordinate efforts at a higher level- do we want to make a joint recommendation to this effect? Let's try to converge on a vision. We want to do research in service of a goal. There was some concurrence with this commentary.

Another member remarked that there could be parallel activities that hew to the tenets of a national plan. The Aerospace Commission is going to recommend closer coordination, therefore Dr. Creedon and Mr. Keegan have a good opportunity to create a vision without past baggage. The committee should not be creating the vision, only give concrete advice on technological capabilities.

NASA's Potential Contributions to Aviation Security

Mr. Pearce discussed NASA's critical roles in exploring advanced aviation and problems of flight in a long-term manner. NASA has a long history of delivering breakthrough technologies, and works on technologies that are beyond the risk tolerance of other agencies. The agency is looking at new models for integrating safety and security. NASA technologies can address some security voids, such as aircraft and system hardening, ATM technologies for identification and management of emergencies (integration with national technologies), passenger/cargo screening, and sensors for security applications (chemical, explosives detection, biological sample collection and detection, human factors).

Aircraft and system hardening concepts include fire- and explosive-resistant materials, advanced fuselage design concepts, and protected area avoidance system (smart aircraft with automated resistance to hijacking). Potential products include a GA security operational concept. Air Traffic Management Systems can help create ground-based decision support to detect and manage threatening or rogue aircraft. NASA has a concept for how to work this into FAA, DoD and NORAD systems. The main problem with passenger/cargo screening is the large volume of information. We want to know how to predict rare events, look at barrier issues, and leverage off of work that has been done in safety programs and in NASA's Pioneering and Revolutionary Technology program. Sensors must have extremely accurate and fast capabilities. A generic sensor architecture was reviewed. Human factors such as screener fatigue are also important.

There is not yet a single point of contact at Homeland Security for coordinating these efforts. A member commented that NASA could function as a Systems House because a lot of industry could do what NASA is doing about ten times faster. NASA could help evaluate these products; maybe NASA should be the architecture and if industry does not step up, then NASA could step up and provide products.

Another member asked: are we going to have a security system that will provide transportation or vice versa? False positives shut down airports and the bad guys win economically. The airlines have reasonably sophisticated systems to reconstitute after weather problems but not after a security incident.

A member commented that separating the control of an aircraft from the control of a pilot should just be forgotten; it won't be accepted. Another member noted that there have been some dramatic misrepresentations about autonomous systems for aircraft- there are legitimate technical, political and cost problems with this solution. There are parts of autonomous systems that already operate independent of the pilot; acceptance may be a matter of degree. A member commented: we routinely accept collision avoidance systems, why not a building avoidance system?

An observation was made concerning an element of obsession with 9/11; we have broad areas of technology advancement; we also need to be worried about high-speed, convenient transportation.

Discussion and Future REDAC/ATAC Activities

Potential action items

Mr. Swain mentioned the need to shift joint meeting times to line up with NASA's budget process; a tentative date was set for February 26 and 27, 2003. This would enable avoidance of budget embargo issues.

He recommended that NASA and FAA develop a joint vision that could ideally be provided in full at the next session. He asked Mr. Keegan and Dr. Creedon to develop a vision of the next generation aviation system.

A member commented that Aviation needs a DOD-style Quadrennial Review (QDR) that transcends administrations, is self-sustaining and institutionalized. Mr. Cappuccio remarked that it would be nice if FAA would give goods and services demands to NASA and vice versa. This may create a win-win solution. David Crow suggested two parallel vision statements that essentially enabled NASA and FAA to work any disagreements privately. Mr. Swain commented that FAA and NASA may, in fact, have a common vision. Dr. Creedon stated that the FAA is NASA's customer; it doesn't work the other way around. Dr. John-Paul Clarke remarked that the customer must make specifications. Mr. Swain noted that it's not always clear that there is a way to successfully transition NASA technology into the FAA. Dr. Creedon observed that there have been NASA products that had been initially robustly opposed by FAA, and expressed the fear that prior approval may lead to only near-term products. Dr. Brackey commented that the country is hungry for leadership; this needs to be accomplished in a reasonable way and needs to be done swiftly.

NASA's Aerospace Technology Advisory Committee (ATAC)

October 2, 2002

Holiday Inn Westpark, Rosslyn, VA

NASA Welcome

Dr. Creedon presented a briefing on NASA's relationship with the ATAC as a Board of Directors (BoD). The NASA Enterprise is tentatively envisioned as 7 offices; 4 of them represent themes that have different product-user interfaces. Budget structures are organized around themes. ATAC is organized in the same fashion and the themes line up one for one. The NASA Advisory Council (NAC) also receives feedback from ATAC. NASA needs ATAC to take a long-range view of NASA policies, with assessments and recommendations that will guide NASA planning and decision-making. Are we making the right investment choices? Are we addressing national needs? Do we plan and execute work in an intelligent way? Are there significant issues on which the ATAC can provide a BoD perspective? NASA should make two types of responses to subcommittee recommendations, one a simple commentary within 2 weeks of receipt of recommendations. The second more formal response would take place in the next scheduled meeting, detailing NASA responses and actions on recommendations. A discussion ensued about the identity of NASA customer. NASA prefers to use the terms "fundors and product users" - these are the FAA, air framers, engine manufacturers, Code M, aeronautics community, and other Enterprises.

NASA's New Enterprise Strategic Plan is updated every 3 years in the context of new agency missions and goals, which are given. Mr. Swain can go to the NAC and get these missions and goals changed, but Dr. Creedon cannot. Members discussed the implications of the new mission, such as quality of life, economic improvement, and environmental issues. Dr. Creedon remarked that those implications are interpreted within the context of revolutionizing aviation; ie, airports with lower noise levels and fewer emissions, and economic benefits such as more jobs. High-paying aerospace jobs won't sell in DC; this would be viewed as corporate welfare. There is no such thing as ongoing funding in this Enterprise; every program goes to zero in a 5-6 year period.

A member commented that the government does shift, as it did in the semiconductor industry; the government may recapitulate on this problem in the aerospace industry. The view from the Office of Management and Budget (OMB) is that there is as much money going into NASA aeronautics as there is in Europe's Vision 2020. This type of funding drives the research enterprises into primarily near-term projects. If NASA were near-term in focus, NASA never would have gotten ATC done at Ames.

A member commented that \$1.1B was hidden in one country alone, details of which were classified. In general, it looks like there will be more money available for long-term plans. Mr. David Crow observed that a consistent policy is needed and asked what role Code R can play in developing this policy; is NASA to lead, follow, facilitate? Dr. Creedon replied that NASA wants to lead as much as possible and sees NASA as having an opportunity to be a major player. NASA has a big percentage of civil aeronautics R & D - about \$1B.

Agency level goals were reviewed with strategic budget themes detailed for aerospace technology themes. Commercial technology includes both spin-in and spin-off; NASA is now welcoming commercial technology spin-in and is trying to work with people the agency would not ordinarily work with, if goals are congruent. Budget structure is such that NASA is not free to move monies from theme to theme. Elements of the strategy are to define a mission statement,

provide a product-user focus for each theme, use this to clearly contribute to mission and vision, and enhance the efficiency and effectiveness of operations. Mr. Kern remarked that there were a few top-level missions and goals that ATAC would have liked to comment on before they were set. Dr. Creedon replied that as Mr. Swain is on the NAC, he could make a comment if the ATAC asks him to. Mr. Swain observed that his impression is that Administrator O’Keefe is systematically carrying out recommendations of the NAC.

A member commented that one can’t be sure how someone is going to use NASA technology; this needs to be made clear. He is also concerned with the use of the word “nation”-- are we bulwarking this knowledge from the world? Dr. Creedon remarked that we need to be careful about how we word this; we are really working for the nation’s interests. Dr. Brackey noted that NASA reports end up in other countries; today it makes a huge impact on competition to have advanced information publicly available. Intellectual property must be protected. Does NASA want to do this? Do we share data on safety? We need to make policy clear on this. Mr. Crow remarked that Europe has not been open to the world on its TRL3 and TRL2 technology; data is not flowing in 2 directions. **Dr. Creedon suggested that ATAC come up with one statement regarding this issue; a clear, commonly accepted policy is needed.** The simple answer is that NASA functions at the taxpayer’s behest; it must not share a safety product that could be manufactured in another country. A question was raised about “early domestic dissemination.” Mr. Swain remarked that NASA data should be directed toward the nation, not the globe.

GPRA metrics were briefly discussed: a GPRA objective is roughly equivalent to a theme objective. The HQ program manager will split up the projects at the centers. Cost-accounting barriers between centers were not regarded as an issue; a “no festering disagreement” policy is in place. All monies will be fully costed. All HQ program managers will not necessarily reside at HQ. Centers are not being held accountable for a whole program. A member commented that program management is obligated to give center managers ample notice when they want to move employees. Organizational structure was reviewed. A program manager must be able to tell when things are going wrong. **There are existing management tools to mitigate information flow problems. All the centers will eventually use the same management planning systems.**

Action item for subcommittee chair-

Review the strategies, objectives and metrics and provide feedback. Metrics need to be couched in near-term, mid-term, and longer term objectives. How quantitative should each of these be? NASA was given a bad score in the past because it cancelled a program, although the cancellation was actually a good thing. Keep in mind that a score will be given on the metrics. There can be a full commentary on this matter at the next meeting.

Dr. Creedon remarked on the view on facilities: the most commonly held view is that facilities are a burden on the agency. The second view is that every facility is vital and will be forever. There is a small band in the middle that believes there should only be facilities that are required to do the in-house portions of NASA programs, or where they are designated national facilities. The facilities should always be adequately and safely maintained, or else shut down. If a facility has no customers, it should be closed. There have been many studies on the NASA facilities particularly the wind tunnels. The messages from those studies are that we need to make decisions necessary to provide world-class test capabilities, however Dr. Creedon doesn’t agree

with this assessment; facilities need to do world-class research. DoD and NASA need to work together with industry to provide national test needs. Current facility challenges are: Should we have a centralized or decentralized management approach. Is it worth it to study what it costs to do studies at each center? Mr. Swain asked if a task force would be necessary. Dr. Creedon replied that he preferred to frame the question more precisely before a task force was formed.

Pricing for use of facilities by the outside user needs to be addressed. A single point of contact for external customers would be useful.

University Research and Competition

A new look at education is under way within NASA; it is a full new mission with a new Enterprise devoted to it. This new office will control approximately \$150M. There is another educational program within the Aerospace Technology Enterprise that receives funding through the approval of the new office. The new education code was formed to present a cohesive picture of how much activity NASA oversees in universities. Issues to be decided are whether there should be many small grants or few large grants, and exclusion of NASA from NRAs. Mr. Swain suggested a move toward fewer, larger grants for better technology, to try to accomplish more at larger centers. The purpose of the new code is to try to best engage universities in helping NASA conduct research, and also brings NASA an enormous amount of good will. Fewer larger grants might cut NASA's own throat. Thirty percent of university money has been earmarked; this needs to be taken into account. The participation of NASA in NRAs was debated.

Mr. Swain commented that the appearance of NASA participation must be straightforward and must not influence grantee choices. Education office money can be used for bricks and mortar through earmarks.

*** potential action item*** Is it a good idea for NASA to compete for NRA funds? NASA researchers strongly desire to compete for NRAs; please provide a recommendation on how to deal with this. NASA management needs to take a clear position on this. How will NASA maintain core competency without competition? **Mr. Swain commented that he hopes that NASA would only use NRAs for outside tasks, because the ethics question is staggering. Action – NASA should collectively look at policy imperatives.**

External Communications

Based on interviews conducted by an external group on NASA's behalf. It was generally agreed that the Enterprise has a unique and valuable role to fulfill in the national R & D context. However, NASA is considered an inconsistent and unreliable partner, risk-averse, and dismissive of feedback. NASA needs a more strategic communication framework and a more consistent message. Better communication strategies will not address the feedback or reliability issues..

Action item **Form a joint team with the REDAC for the air transportation system-Ed, Herm, John Kern. Come back to this in the February meeting.**

Subcommittee Reports and Discussion

Pioneering and Revolutionary Technology (PRT) Subcommittee

Mr. John Junkins briefed the ATAC on NASA's PRT. A top-down dollar distribution of \$276M total was reviewed. Resource allocation was slanted toward computers communication and computer science, not necessarily balanced in the 3 main areas of PRT. The three blocks of research have a lot of heritage, which implies some inertia.

Some objectives need to be redefined to articulate NASA's mission to act as a leader in scientific research, mapping basic science and engineering developments into TRLs.

With respect to the current Enterprise Goals and Objectives, a third objective was recommended for PRT: to perform technology demonstrations (fits under CICT). Mr. Spitzer commented that it was important to put the right things in the right buckets and avoid a near-term focus for PRT.

Some general questions included: Are other centers able to transfer technologies? Who is the recipient of the PRT results? Is there a communication path? The whole PRT theme is being planned from the top down. Mr. Crow commented that if technologies are at TRL-6, the technologies should be closer to the user community. At TRL-0, there should be no relation.

CICT has been cobbled together hastily and does not necessarily fit under the PRT rubric in all respects. Computing and software is regarded as overfunded, and disagreement exists over internal versus external research spending.

Dr. Creedon noted that NASA centers can compete for the \$40M NRA; this is a gut-wrenching issue with religious adherents on both sides. ***Action item?*** The position expressed was that Dr. Creedon should take a long look at this. NRAs are predominantly single investigator programs. Other approaches and cross-disciplinary teams should be considered.

PRT by design should be able to accommodate new ideas. Dr. Creedon commented that a frequent center complaint is the continual replanning of the program; subcommittees should not just say "do more of this"; qualify it with "do less of that," for example. Interagency collaborations should be considered in the PRT effort. Dr. Creedon suggested that the frequency of advisory groups and subcommittee reviews should be considered.

Engineering for Complex Systems was deemed an impressive effort. **Benchmarking should be done perhaps by the NRC Quality Review Subcommittee in order to determine who is doing the best, or overlapping, work.**

Action items Engineering for Complex Systems: Want committee to better understand what it is. Very early in the design of a system, risk should be explicitly identified and tracked. There are new R & D tools in this area, including resilient systems and operations, intelligent software for robust and resilient software, and software with implicit decision-making capabilities. Knowledge engineering for safe systems is focused on the human element of failure in terms of risk analysis. **Mr. Swain suggested that NASA look at what Lockheed is doing on the Joint Strike Fighter (JSF) in terms of risk management.**

Mr. Swain added that the NRA's purpose is to put research out where other people can do it. Dr. Creedon stated that he was not sure that "as only NASA can" mission statement means strictly in-house. NASA wants centers to be cutting-edge, but also wants them to work as a team. Centers should not compete for NRAs, but should work with those who have the NRA.

Getting software certified in an efficient manner is a problem for the avionics industry; we need a standard for this. Is this something that might relate to the CICT program?

Dr. Brackey noted that maintaining center competence can't be done by just managing programs. An appropriate amount of challenging work needs to be done inside. Dr. Creedon encouraged the

ATAC to write this as a finding. Revolutionary technology needs some mapping, a temporal framework; near, mid, and long term, with risk and cost accountability also under consideration.

Revolutionize Aviation Subcommittee (RAS)

Mr. David Crow summarized subcommittee results. There is a website up and running, and a report of the past meeting is due soon. Working groups have been assigned with a task to assess the technologies necessary to achieve goals. Is there a connection to the organization that will receive the results and resources available to achieve the goal? Is there an implementation plan, a waiting user, or other compelling reason to achieve the goal? Some are close to consensus conclusions. There is a clearly stated goal for safety. The program is green, by and large. There are worries about NASA's long-term credibility; it is assumed that NASA has solved all the problems. NASA needs to make sure its work is connected to FAA and the general aviation community, and needs to talk about alignment of the user organizations with NASA goals. The infrastructure is probably the best delineated aspect. There are some software deliverables for FAA, some ideas on future tasks, and a modeling effort (VAMS). The task is to clearly define goals. The vehicle program is still in formulation and was applauded by the subcommittee. The group has proposed 5 vehicles that can benchmark technologies: advanced subsonic vehicle; supersonic small business jet; runway independent vehicle; high altitude UAV; and personal aviation vehicle. By February, the vehicle metrics will be adequate. Infrastructure will be aligned to mobility. Safety is specifically the aviation safety reporting system. Before budget numbers are reported, technologies and existing programs must first be evaluated.

Commercial Technology Subcommittee (CTS)

Dr. Tom Brackey gave a status report of work not done and asked guidance from Mr. Swain and Dr. Creedon. The scope of work, interaction with commercial technology program, and outputs were briefly reviewed, and terms of reference (TOR) defined. The CTS supports ATAC and reports to Mr. Swain. The Commercial Technology Program (CTP) is the steward of the partnership between NASA and the commercial base. Program goals are to advance NASA tech objectives such as technological connectivity to business world, industry technology needs, and expertise in how partnerships are facilitated. Some successes in commercialization can be measured by the numbers of NASA patents and licenses. The commercialization process was reviewed. Specifics in the TOR are to provide advice on strategies for the NASA CTP, and provide insight into national trends and industry practices. The CTS will assess NASA practices and how they might work in the venture capital/business community, look at creative marketing techniques, and explore potential collaborations with academic community, other government agencies (OGA), and nonprofits. The membership mix includes small businesses, universities, OGA, and PRTS members. ROI, relevance of work, and success stories may be used to assess the status of U.S. competitiveness and academic leadership. Next steps are to define skills for members, recommend candidates, define plan of work, beginning with a review of the existing CTP.

Action item**Mr. Swain remarked that the first assignment is to look at process of commercialization and compare it to best practices in industry. Once this is done, the subcommittee should review goals and metrics, and take a second look at the policy at some point.** Competitiveness is interpreted as anything NASA does to spin into the industrial sector to

enhance competitiveness. Is the aerospace industry as competitive as it was? **Look at the process. For Dr. Creedon- Look at the NASA process. Does NASA have the best process for getting return on its resource? Start with the scope of the Norwood program. Spinoffs have been going on for some time. Metrics have been largely anecdotal. The ATAC also ought to weigh in on policy changes. In terms of spin-in- how much commonality does it have with PRT? SBIR is prescribed; it ought to spend more time on the budget that exists. Assessing U.S. competitiveness is a much larger job than the ATAC can handle.**

Strategic Discussions – continued

Dr. Creedon commented: suppose you have a vision, operations concept and architecture, and a 10-year, low-risk evolution- will you do things that are risky or will you do things better? A member remarked that we're going to be brought up short compared to Europe if a vision is not embraced. A discussion ensued on dealing with the guidelines of OEP or RTCA. There needs to be closer coordination and cooperation, but more importantly we must decide what we intend to do, with a scope of activities and timeframes. Operators have a short-term focus and are risk-averse- they must be coupled with groups with longer term visions. Technologies must be identified in order for research to be performed. A member commented that operators and controllers have decided that Terrain Collision Avoidance System (TCAS) should be followed, not the controller. Technology trumps human elements; this is an opportunity to move automated systems forward.

Report on the Recommendations from the April meeting

Dr. Creedon reviewed the NASA response to recommendations from the previous meeting. A member asked if space launch systems analysis and the vehicle systems analysis should be done in the same place? Not everyone means the same thing by "systems analysis." The failure of the composite fuel tank soured the attitude toward composite materials in general. Risk versus weight was the issue; it was a complicated story. The SLI program may be revisited. **Add SBIR aspects to PRT.** Self-assessments of NASA must be reviewed with the ATAC before performance assessments are submitted to the NAC. Rationales behind color codes were briefly discussed. Dr. Creedon commented that Code Blue engenders poor behavior and low goal setting; it would be preferable to write down a difficult goal. He is currently working on a Code R Implementation Plan, including milestones and timeframes. Mr. Swain commented that NASA will be stuck with GPRA; measure internal progress with the implementation plan. Mr. Swain enumerated the status of the recommendations. 1-4 are closed. 5 is open, 6 is sort of open till we get clarity. 7 is open. 8 is closed, but be clear on TRL level. 9 is open, but close to closure. 10 is closed. 11 is still open. 12 is closed for SLI but open for long-term. 13 is closed; comment on 13- to get the cost down, SLI was to remove personnel. 14 is open. 15 and 16 are closed. 17 is open. 18 is more a description of a process. 15 needs to be revisited: there is a disconnect in the timeframes represented. It is not all long-term. 19 is open: **ATAC wants a 10-year plan for the facilities.**

Roundtable comments

Ed Stevens- Would like to see presentation material beforehand.

John Junkins- Brackey's presentation is important to get our minds around- how much effort are we going to expend over the next year? Chairs need to be interacting to ensure focused productivity.

Aaron Gellman- cautioned NASA not to cast net too broadly in R & D. Transportation Security Agency has already gone from FAA to DOT. Pick only 4 or 5 things NASA can do very well, not necessarily unique, even if in competition with Homeland Security. Also, the insurance industry has experts in risk assessment and management; NASA should talk to people who insure against catastrophe. Insurance is finally showing signs of interest in aviation safety, forming rates on an actuarial basis for the first time. FAA's space transportation office ensures the safety of commercial launch operations, it is not yet a certifying agency. Avoid duplication.

Dave Crow- pleased by progress, reorganization. NASA should consider its role in developing a National Aerospace Plan.

Dev Banerjee- echoed praise. NASA should look at how industry manages programs. What's in it for the scientist at the working level? Praised Dan's Oct 1 presentation and critical assessment. Need better planning with DoD. Restructuring committees are going from function-based to program-oriented organization structure. How can you cross-link centers of excellence to subcommittees? Response: Dr. Creedon- each center has a different mechanism for reviewing various competencies.

A member asked, "what is the relationship between this group and the Aviation Safety Council?" Try to get some of their issues into this group (ATAC). We can brief them with the results of this meeting.

Unknown comment- Need qualified members in the subcommittees. Always hearing how frustrated NASA is by the lack of resources, but need to know which resources are needed.

Herm Rediess- likes the logical approach and the statements about bold, high risk ventures –don't see enough high-risk ideas at the program level. Would like to join the Revolutionize Aviation Subcommittee.

Robert Spitzer- NASA is doing the right things. What are the underlying real reasons you have done some things? Are you trying to push the state of the art? Need to know more about this. Ask for specific advice.

Tom Brackey- delighted with Dr. Creedon's clarity. Reestablish a cutting edge competence in the centers; NASA needs to be a smart customer.

Dr. Creedon closed by thanking all his Code R staff.